

WHAT IS CLAIMED IS:

1. A nucleic acid molecule comprising two or more repeat-containing sequences having the formula

$$\begin{array}{l} (X_1 X_2)_n \\ (Y_1 Y_2)_n \end{array}$$

wherein:

X_1 and X_2 are single nucleotides or derivatives thereof which may or may not be identical;

Y_1 and Y_2 are single nucleotides or derivatives thereof complementary to X_1 and X_2 , respectively; and

n is an integer from 1 to 1×10^{10} ,

and wherein two or more of said repeat-containing sequence copies are separated by a restriction site and the nucleotide compositions of $(X_1 X_2)_n$ and $(Y_1 Y_2)_n$ are substantially identical.

2. A nucleic acid molecule comprising two or more repeat-containing sequences having the formula

$$\begin{array}{l} (X_1 X_2)_n A_m \\ B_m (Y_1 Y_2)_n \end{array}$$

wherein:

X_1 and X_2 are single nucleotides or derivatives thereof which may or may not be identical;

Y_1 and Y_2 are single nucleotides or derivatives thereof complementary to X_1 and X_2 , respectively;

n is an integer from 1 to 1×10^{10} ;

A is a nucleotide or a derivative thereof;

B is a nucleotide or a derivative thereof; and

m is an integer from 1 to 100,

wherein two or more of said repeat-containing sequence copies are separated by a restriction site and wherein the nucleotide compositions of $(X_1X_2)_nA_m$ and $B_m(Y_1Y_2)_n$ are substantially identical.

3. The nucleic acid molecule of claim 1 or claim 2, wherein said nucleic acid molecule is a DNA molecule.

4. The nucleic acid molecule of claim 1 or claim 2, wherein said nucleic acid molecule is a RNA molecule.

5. The nucleic acid molecule of claim 1 or claim 2, wherein said nucleic acid molecule is a DNA/RNA hybrid molecule.

6. The nucleic acid molecule of claim 1 or claim 2, wherein said nucleic acid molecule is double-stranded.

7. The nucleic acid molecule of claim 6, wherein two or more of said repeat-containing sequences are separated by cleavage at said restriction site.

8. The nucleic acid molecule of claim 7, wherein said cleavage forms monomer, dimer and trimer repeats of said repeat-containing sequence.

9. The nucleic acid molecule of claim 8, wherein said cleavage further forms tetramer and pentamer repeats of said repeat-containing sequence.

10. The nucleic acid molecule of claim 7, wherein said cleavage forms one or more multimer repeats of said repeat-containing sequence.

11. The nucleic acid molecule of claim 7, wherein two or more of said separated repeat-containing sequences are subjected to conditions sufficient to make said sequences single-stranded.

12. The nucleic acid molecule of claim 7, wherein said separated repeat-containing sequences are detectably labeled.

13. The nucleic acid molecule of claim 11, wherein said single-stranded sequences are detectably labeled.

14. The nucleic acid molecule of claim 12 or claim 13, wherein said detectable label is selected from the group consisting of a radiolabel, a fluorescent label and a chemiluminescent label.

15. The nucleic acid molecule of claim 1 or claim 2, wherein said repeat-containing sequences have a length of from about 5 nucleotides to about 1000 nucleotides.

16. The nucleic acid molecule of claim 15, wherein said repeat-containing sequences have a length of from about 5 nucleotides to about 100 nucleotides.

17. The nucleic acid molecule of claim 1 or claim 2, wherein said repeat-containing sequences have substantially the same base compositions in the top and bottom strands.

18. The nucleic acid molecule of claim 1 or claim 2, wherein said nucleotides or derivatives thereof are selected from the group consisting of dUTP, dATP, dTTP, dCTP, dGTP, dITP, ATP, TTP, GTP, CTP, 7-deaza-dGTP, α dATP, α dTTP, α dGTP, α dCTP, ddATP, ddTTP, ddCTP and ddGTP.

19. The nucleic acid molecule of claim 1 or claim 2, wherein n is an integer from 1 to 1×10^6 .

20. The nucleic acid molecule of claim 2, wherein n is an integer from 1 to 1×10^3 and m is an integer from 1 to 10.

21. A vector comprising the nucleic acid molecule of claim 1 or claim 2.

22. The vector of claim 21, wherein said vector is pAH102.4.

23. A host cell comprising the nucleic acid molecule of claim 1 or claim 2.

24. A host cell comprising the vector of claim 21.

25. A nucleic acid ladder comprising the nucleic acid molecule of claim 6.

26. A nucleic acid ladder comprising the nucleic acid molecule of claim 11.

27. A method for making a nucleic acid ladder, said method comprising

- mixing the nucleic acid molecule of claim 1 or claim 2 with a restriction enzyme which cleaves at said restriction site; and
- incubating said mixture under conditions favoring the cleavage of said nucleic acid molecule at one or more of said restriction sites.

28. The method of claim 27, said method further comprising treating said nucleic acid molecule under conditions favoring the conversion of said nucleic acid molecule into a single-stranded form.

29. A nucleic acid ladder made according to the method of claim 27.

30. A method for determining the size of a nucleic acid molecule, said method comprising

- separating the nucleic acid ladder of claim 25 and said nucleic acid molecule according to size; and
- determining the size of said nucleic acid molecule by comparison to said nucleic acid ladder.

31. A method for determining the size of a nucleic acid molecule, said method comprising

(a) separating the nucleic acid ladder of claim 26 and said nucleic acid molecule according to size; and

(b) determining the size of said nucleic acid molecule by comparison to said nucleic acid ladder.

32. A method for determining the size of a nucleic acid molecule, said method comprising

(a) separating the nucleic acid ladder of claim 29 and said nucleic acid molecule according to size; and

(b) determining the size of said nucleic acid molecule by comparison to said nucleic acid ladder.

33. A kit comprising one or more containers, wherein a first container contains the nucleic acid molecule of claim 1 or claim 2.

34. A kit comprising one or more containers, wherein a first container contains the nucleic acid ladder of any one of claims 25, 26 or 29.

and B)